

CLAIMS

1. An x-ray tube, comprising:

a vacuum enclosure in which is disposed an electron producing cathode and a stationary anode, the stationary anode being positioned to receive at least some of the electrons emitted by the cathode, wherein the stationary anode comprises:

a substrate having first and second ends; and

a target cap having top and side walls that together define a cavity that at least partially receives the first end of the anode substrate and in a manner such that the side walls extend in a direction towards the second end of the anode substrate, and wherein the target cap defines a target surface comprised of an x-ray producing material at a point such that at least some of the electrons emitted by the cathode impinge the target surface to produce primary x-rays having one or more characteristic wavelengths.

2. An x-ray tube as defined in claim 1, wherein at least a portion of the target cap comprises a material selected from the group consisting of rhodium, palladium, molybdenum, titanium, and tungsten or alloys thereof.

3. An x-ray tube as defined in claim 1, wherein the cavity is cylindrically shaped.

4. An x-ray tube as defined in claim 1, wherein the cavity receives the first end of the substrate so as to form a substantially contiguous fit therebetween.

5. An x-ray tube as defined in claim 1, wherein the side wall is comprised of a material such that x-rays emitted therefrom have secondary wavelengths that do not interfere with the primary x-rays produced by the target surface.

6. An x-ray tube as defined in claim 5, wherein the secondary x-rays have characteristic wavelengths that are substantially identical to the characteristic wavelengths of the primary x-rays produced at the target surface.

7. An x-ray tube as defined in claim 1, wherein the target surface has a substantially planar shape.

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8. A target cap configured for attachment to a stationary anode substrate, the stationary anode substrate being disposed within a vacuum enclosure in an x-ray tube, wherein the target cap comprises:

a planar top wall defining a target surface and a continuous side wall, wherein the walls cooperate to define a cavity into which a portion of the stationary anode substrate is received, and wherein the top wall is comprised of a material that produces primary x-rays when impinged by electrons, at least some of the primary x-rays having one or more characteristic wavelengths, and wherein the side wall is comprised of a material such that the side wall produces secondary x-rays when impinged by electrons, the secondary x-rays having wavelengths that do not interfere with the primary x-rays.

9. A target cap as defined in claim 8, wherein at least some of the secondary x-rays produced by the side wall have one or more characteristic wavelengths that are substantially identical to the one or more characteristic wavelengths of at least some of the primary x-rays

10. A target cap as defined in claim 9, wherein the thickness of the top wall is in a range from about 0.01 inch to about 0.1 inch.

11. A target cap as defined in claim 9, wherein the thickness of the side wall is in a range from about 0.01 inch to about 0.1 inch.

12. A target cap as defined in claim 9, wherein the length of the side wall is in a range of from about 0.05 inch to about 0.5 inch.

13. A target cap as defined in claim 8, wherein the target cap comprises a material selected from the group consisting of rhodium, palladium, molybdenum, titanium, and tungsten and alloys thereof.

14. A target cap as defined in claim 8, wherein the cavity is cylindrically shaped.

15. A target cap as defined in claim 8, wherein the outer periphery of the top wall is circular.

16. A target cap as defined in claim 8, wherein the outer surface of the side wall is cylindrically shaped.

17. A target cap as defined in claim 8, wherein the stationary anode substrate comprises copper or a copper alloy.

18. A method for preventing the production of x-rays from a substrate portion of a stationary anode, the stationary anode being disposed together with an electron producing cathode in an x-ray tube, the method comprising the steps of:

providing a mass of material that is capable of producing x-rays when electrons are impinged upon it;

forming from the mass of material a target cap having a body comprising a top wall defining a target surface, and at least one side wall that together form a cavity, and wherein the target surface is capable of producing primary x-rays having one or more characteristic wavelengths when electrons produced by the cathode are impinged upon it; and

disposing an end of the substrate portion of the stationary anode within the cavity of the target cap such that at least a part of the substrate portion that is susceptible to impingement by electrons backscattered from the target surface is covered thereby.

19. A method for preventing the production of x-rays as defined in claim 18, wherein the disposing step further comprises the step of affixing the target cap to the end of the substrate portion.

20. A method for preventing the production of x-rays as defined in claim 18, further comprising the step of:

cleaning the target cap prior to disposing an end of the substrate portion of the stationary anode within the cavity of the target cap so as to prevent contamination of the x-ray tube.